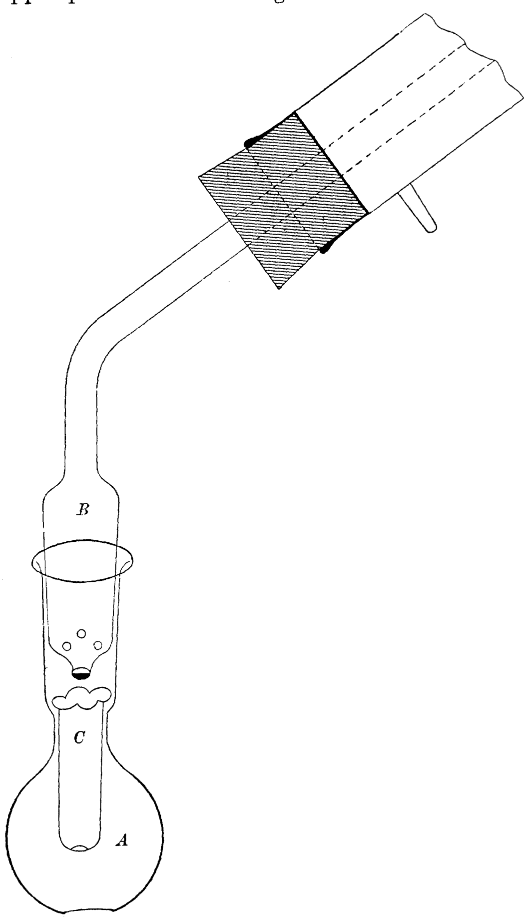
ON A NEW APPARATUS FOR THE CONTINUOUS EXTRACTION OF SOLIDS BY A VOLATILE SOLVENT.

BY J. T. WILLARD AND G. H. FAILYER.

The authors have devised a new form of extraction apparatus, which is so satisfactory to them that they think a brief description of it may be of interest to other chemists. It consists of three parts: the flask *A*, the condenser *B*, and the perforated tube *C*. The flask is 14–15 cm. in height, and weighs about 45 grams. The upper part of the neck is ground to fit the condenser, and is 3 cm. in diameter. The lower part of the neck contracts suddenly to 2.5 cm. in diameter, thus presenting an annular projection within, which supports the perforated tube. The tube of the condenser is about 75 cm. long, and has an internal diameter of 8 mm. Near the lower end it is bent at an angle of 60°, and passed upward through a copper tube 3–4 cm. in diameter, which is supplied with cold water when in use. The lower end expands into a stopper for the flask, and the extremity is brought nearly to a point to direct the dropping of the condensed solvent. Three additional openings are made in the stopper expansion to allow the vapor free passage upward. The perforated tube is similar to a short, wide test-tube with the bottom perforated. The lip is notched to give openings for the passage of the vapor. The body of the tube must pass readily through the contraction in the neck of the flask, and at the same time the lip must rest securely on the inner projection. The lower end of the tube may reach within 1.5–2 cm. of the bottom of the flask.



A, the flask; *B*, the condenser tube; *C*, the perforated tube. *B* and *C* are shown somewhat raised from their positions when in use.

The mode of using the apparatus is almost obvious. The substance to be treated is confined in the perforated tube between two layers of asbestos, a sufficient amount of the volatile solvent is put into the previously-weighed flask, and the parts are put in place and suitably supported. Upon heating the solvent by means of a water bath the vapor is evolved with any rapidity desired, and passes into the condenser. The condensed solvent flows uninterruptedly down the same tube, drops into the

perforated tube, filters through the substance to be extracted, and passes back into the flask. After the operation has continued as long as is desired, the perforated tube is removed, the apparatus inclined so as to carry the condensed liquid out instead of back, and the solvent distilled off. The solvent may thus be recovered, which is an item of no small importance where ether is used and many determinations are to be made. The flask with the substance extracted is then carefully dried and weighed.

The chief advantages of this extractor are, its simplicity and consequent convenience of handling, and its freedom from corks which come in contact with the solvent. It avoids the slender tubes and multiplicity of connections so common in extractors, and at the same time can be manufactured at a very moderate cost· Every chemist knows the difficulty and inconvenience of completely removing the soluble substances from corks, but if it is desired the flask can be made without having the neck ground, and it can be connected by a cork to an inverted Liebig's condenser. In this form the extractor is still cheaper, and, even with the one cork, is more desirable than any other form that has come under our notice.

This apparatus was designed for quantitative work, but with some modifications it might be adapted to pharmaceutical operations. The flask would have to be made deeper and the neck much wider, to admit a large perforated tube. The flask could be connected with the condenser by means of a broad ring of glass, ground on its outer edge to fit the neck of the flask, and within to fit the condenser tube. In that way an apparatus of considerable capacity could be constructed, and we think at less cost than those now in use.

REPORT ON GEOLOGY.

BY ROBERT HAY,

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The writer does not know of any geological work accomplished in the State during the past year, which is available for this report to the Academy, except that done by himself, most of which will be given in papers on definite subjects. There is one point, however, to which he must definitely refer here, viz., the easterly extension of the Tertiary formations in southern Kansas. In the northern part of the State the eastern limit has been marked by Prof. Mudge and Prof. St. John, with some approach to accuracy, notwithstanding the difficulty of distinguishing them in that region from the yellow marl or other quarternary deposit. In the southern part, however, no map of the State has yet recognized the existence of Tertiary deposits south of the Arkansas river, or as immediately resting on paleozoic formations. The writer has found this year, however, that the formation which in his report on Norton county he called the Equüs Beds (Cope), is the deposit forming the high prairie in the counties of Hamilton, Finney, Seward, Ford, Edwards, Pratt, Comanche, Barber, Kingman, and Sedgwick. In the latter county he found it east of the sixth principal meridian, east of the Arkansas river, a few miles out of Wichita, and there it was in contact with the Permian strata of the region.

In many places this formation, which in our note-books we uniformly designate as tertiary marl, lies over the same deposit which in the northwest we have called the Loup Fork. It contains the same fossils, mammalian bones, and turtle; and has the same variety of structure, from a mortar-like grit to a heavy conglomerate. In several places, however, it was manifest that the mortar-like grit is the upper part of the deposit, the conglomerate being below. We found the conglomerate beneath the